IN THE CLAIMS:

1. (Currently Amended) A gas sensor comprising a cavity for containing a gas; means for generating radiation which is transmitted through the cavity and including one or more wavelengths which is absorbed in use by a gas to be detected; and a detector for detecting radiation which has passed through the cavity, the detector having a surface area which is visible to the interior of the cavity, the walls of the cavity being sufficiently reflective to the radiation that the cavity is substantially ~~uniformally~~ uniformly illuminated with the radiation, such that the visible surface area of the detector is illuminated with substantially unfocussed radiation, wherein the radiation generating means and/or detector(s) is mounted on a printed circuit board and is surrounded by resilient protection.

2. (Currently Amended) A sensor according to claim 1, wherein the resilient protection comprises a resilient member having one or more apertures through which the radiation generating means and/or respective detector (s) extends.

3. (Currently Amended) A sensor according to claim 2, ~~whereon~~ wherein the radiation generating means and/or respective detector(s) extends in a close fitting relationship through the aperture(s).

4. (Currently Amended) A sensor according to ~~the preceding claims~~ claim 1, wherein the pcb and the components mounted thereon are located in an electronics housing having an upper wall, the upper surface of which defines a wall of the cavity.

5. (Currently Amended) A sensor according to ~~any of claims 2 to 4~~ claim 2, wherein the resilient member and electronics housing have complementary keying features which interengage.

6. (Currently Amended) A gas sensor according to ~~any of the preceding claims~~ claim 1, wherein the cavity comprises a first end wall adjacent to which at least one of the means for generating radiation and the detector is positioned, a second end wall which opposes the first end wall, and a side wall; the first and second end walls defining the height

of the cavity between them and the width of the cavity being defined as a maximum dimension of the cavity orthogonal to its height, wherein the ratio of the height to the width is greater than or equal to 0.1 and less than [[1]] 0.7.

7. (Currently Amended) A gas sensor according to ~~any of claims~~ claim 1, ~~to 5, wherein the cavity comprises a first end wall adjacent to which the means for generating radiation and the detector are positioned, a second end wall which opposes the first end wall, and a side wall; the width of , the cavity being defined as the maximum dimension of the cavity along a line joining the means for generating radiation and the detector, and the height of the cavity being defined as the maximum dimension of the cavity in a direction orthogonal to its width, wherein the ratio of the height to the width is greater than or equal to 0.1 and less than 1~~ wherein the entire visible surface area of the detector is illuminated with substantially unfocussed radiation.

8. (Currently Amended) A gas sensor according to claim ~~6 or claim 7, wherein the height to width ratio is greater than or equal to 0.2~~ 1, wherein increasing the visible surface area of the detector relative to the surface area of the cavity walls increases the signal to noise ratio detected by the detector.

9. (Currently Amended) A sensor according to claim [[8]] 1, wherein the ~~height to width ratio is greater than or equal to 0.4~~ radiation generating means generates infra-red radiation.

10. (Currently Amended) A sensor according to claim ~~9, wherein the height to width ratio is greater than or equal to 0.5~~ 1, wherein the infra-red radiation generating means comprises a heating element to heat gas within the cavity so as to cause the gas to generate infra-red radiation.

11. (Currently Amended) A sensor according to ~~any of claims 6 to 10 wherein the height to width ratio is less than or equal to 0.7~~ claim 1, further comprising one or more additional radiation detectors, each detector being adapted to sense radiation centered on a respective, different wavelength.

12. (Currently Amended) A [[gas]] sensor ~~comprising a cavity for containing a gas; means for generating radiation which is transmitted through the cavity and including one or more wavelengths which is absorbed in use by a gas to be detected; and 4 detector for detecting radiation which has passed through the cavity, the detector having a surface area which is visible to the interior of the cavity, the walls of the cavity being sufficiently reflective to the radiation that the cavity is substantially uniformally illuminated with the radiation, wherein the cavity is tubular, for example cylindrical, and has substantially planar end walls, adjacent to at least one of which, at least one of the means for generating radiation and the detector is positioned and wherein the ratio of the height to the width of the cavity is greater than or equal to 0.1 and less than or equal to 0.7~~ according to claim 1, wherein the cavity wall defines a window allowing radiation to pass therethrough to the or a respective detector.

13. (Currently Amended) A sensor according to claim [[12]] 1, wherein ~~the height to width ratio is greater than or equal to 0.2~~ a majority, preferably more than 90% of the cavity walls have a reflectivity to radiation exceeding 95%.

14. (Currently Amended) A sensor according to claim [[13]] 1, wherein ~~the height to width ratio is greater than or equal to 0.4~~ at least a portion of the cavity walls are provided with a reflective coating.

15. (Currently Amended) A sensor according to claim 14, wherein the ~~height to width ratio is greater than or equal to 0.5~~ reflective coating comprises gold plating.

16. (Currently Amended) A sensor according to ~~any of claims 12 to 15~~ claim 1, wherein the ~~visible surface of the detector is illuminated with substantially unfocussed radiation~~ cavity walls are covered by a radiation transparent protective coating.

17. (Currently Amended) A [[gas]] sensor according to ~~any of the preceding claims~~ claim 1, wherein the ~~entire visible surface area of the detector is illuminated with substantially unfocussed radiation~~ cavity is tubular, for example cylindrical, and has substantially planar end walls.

18. (Currently Amended) A [[gas]] sensor according to ~~any of the preceding claims~~ claim 1, wherein ~~increasing the visible surface area of the detector relative to the surface area of the cavity walls increases the signal to noise ratio detected by the detector~~ the cavity, means for generating radiation, and detector are located within an outer housing having at least one aperture to allow gas to enter.

19. (Currently Amended) A sensor according to ~~any of claims 12 to 18~~ claim 18, ~~wherein the radiation generating means and/or detector(s) is mounted on a printed circuit board and is surrounded by resilient protection~~ further comprising a flame arrestor within the outer housing.

20. A sensor according to claim 19, wherein the ~~resilient protection comprises a resilient member having one or more apertures through which the radiation generating means and/or respective detector(s) extends~~ flame arrestor is secured to an outer surface of a housing having at least one aperture, the housing defining a wall of the cavity, by a flange which overlaps the flame arrestor, whereby when the cavity housing is assembled in the outer housing, the flange defines the thickness of a gas chamber communicating with the apertures in the outer and cavity housings.

21. (Currently Amended) A sensor according to claim [[20]] 18, ~~wherein the radiation generating means and/or respective detector(s) extends in a close fitting relationship through the aperture(s)~~ further comprising a memory such as an EEPROM, located within the outer housing for storing calibration data, the memory being coupled with electrical contacts such as pins accessible from outside the outer housing.

22. (Currently Amended) ~~A sensor according to any of claims 19 to 21, wherein the pcb and the components mounted thereon are located in an electronics housing having an upper wall, the upper surface of which defines a wall of the cavity~~ A gas sensor comprising a cavity for containing a gas; means for generating radiation which is transmitted through the cavity and including one or more wavelengths which is absorbed in use by a gas to be detected; and 4a detector for detecting radiation which has passed through the cavity, the detector having a surface area which is visible to the interior of the cavity, the walls of the cavity being sufficiently reflective to the radiation that the cavity is substantially uniformly

illuminated with the radiation, wherein the cavity is tubular, for example cylindrical, and has substantially planar end walls, adjacent to at least one of which, at least one of the means for generating radiation and the detector is positioned and wherein the ratio of the height to the width of the cavity is greater than or equal to 0.1 and less than or equal to 0.7.

23. (Currently Amended) A sensor according to ~~any of claims 20 to~~ claim 22, wherein the ~~resilient member and electronics housing have complementary keying features which interengage~~ height to width ratio is greater than or equal to 0.2.

24. (Currently Amended) A sensor according to ~~any of the preceding claims, wherein the radiation generating means generates infra-red radiation~~ claim 23, wherein the height to width ratio is greater than or equal to 0.4.

25. (Currently Amended) A sensor according to claim 24, wherein the ~~infra-red radiation generating means comprises a heating element to heat gas within the cavity so as to cause the gas to generate infra-red radiation~~ height to width ratio is greater than or equal to 0.5.

26. (Currently Amended) A sensor according to ~~any of claims 1 to 24~~ claim 22, wherein the ~~means for generating radiation comprises al filament bulb or LED (s)~~ visible surface of the detector is illuminated with substantially unfocussed radiation.

27. (Currently Amended) A gas sensor according to ~~any of the preceding claims~~ claim 22, wherein the ~~radiation generating means is located, at least partially, in the cavity~~ entire visible surface area of the detector is illuminated with substantially unfocussed radiation.

28. (Currently Amended) A gas sensor according to ~~any of the preceding claims~~ claim 22, ~~further comprising one or more additional radiation detectors, each detector being adapted to sense radiation centered on a respective, different wavelength~~ wherein increasing the visible surface area of the detector relative to the surface area of the cavity walls increases the signal to noise ratio detected by the detector.

29. (Currently Amended) A sensor according to ~~any of the preceding claims~~ claim 22, wherein the ~~cavity wall defines a window allowing radiation to pass therethrough to the or a respective detector~~ radiation generating means and/or detector(s) is mounted on a printed circuit board and is surrounded by resilient protection.

30. (Currently Amended) A sensor according to ~~any of the preceding claims~~ claim 29, wherein the ~~cavity is substantially closed and has at least one aperture to allow passage of gas into and out of the cavity~~ resilient protection comprises a resilient member having one or more apertures through which the radiation generating means and/or respective detector(s) extends.

31. (Currently Amended) A sensor according to ~~any of the preceding claims~~ claim 30, wherein ~~a majority, preferably more than 90%, of the cavity walls have a reflectivity to radiation exceeding 95%~~ the radiation generating means and/or respective detector(s) extends in a close fitting relationship through the aperture(s).

32. (Currently Amended) A sensor according to ~~any of the preceding claims~~ claim 29, wherein ~~at least a portion of the cavity walls are provided with a reflective coating~~ the pcb and the components mounted thereon are located in an electronics housing having an upper wall, the upper surface of which defines a wall of the cavity.

33. (Currently Amended) A sensor according to claim [[32]] 30, wherein the ~~reflective coating comprises gold plating~~ resilient member and electronics housing have complementary keying features which interengage.

34. (Currently Amended) A sensor according to ~~any of the preceding claims~~ claim 22, wherein the ~~cavity walls are covered by a radiation transparent protective coating~~ radiation generating means generates infra-red radiation.

35. (Currently Amended) A sensor according to ~~any of claims 1 to 11~~ claim 34, wherein the ~~cavity is tubular, for example cylindrical, and has substantially planar end walls~~

infra-red radiation generating means comprises a heating element to heat gas within the cavity so as to cause the gas to generate infra-red radiation.

36. (Currently Amended) A sensor according to ~~any of the preceding claims, wherein the cavity, means for generating~~ claim 22, further comprising one or more additional radiation~~, and detector are located within an outer housing having at least one aperture to allow gas to enter~~ detectors, each detector being adapted to sense radiation centered on a respective, different wavelength.

37. (Currently Amended) A sensor according to claim ~~36, further comprising a flame arrestor within the outer housing~~ 22, wherein the cavity wall defines a window allowing radiation to pass therethrough to the or a respective detector.

38. (Currently Amended) A sensor according to claim [[37]] 22, wherein ~~the flame arrestor is secured to an outer surface of a housing having at least one aperture, the housing defining, well of the cavity, by a flange which overlaps the flame arrestor whereby, when the cavity housing is assembled in the outer housing, the flange defines the thickness of a gas chamber communicating with the apertures in the outer and cavity housings~~ a majority, preferably more than 90% of the cavity walls have a reflectivity to radiation exceeding 95%.

39. (Currently Amended) A sensor according to any of ~~claims 36 to 18, further comprising a memory such as an EEPROM, located within the outer housing for storing calibration data, the memory being coupled with electrical contacts such as pins accessible from outside the outer housing~~ claim 22, wherein at least a portion of the cavity walls are provided with a reflective coating.

40. (Currently Amended) A ~~method of constructing a gas~~ sensor according to ~~any of claims 1 to~~ claim 39, ~~the method comprising:~~ wherein the reflective coating comprises gold plating.

~~(a) inserting a tubular, optical housing, closed by a well at one end except for at least one gas access aperture, into a tubular outer housing closed at its end adjacent the closed end of the optical housing, except for at least one gas access opening;~~

~~(b) inserting a radiation source and detector on a printed circuit board into a tubular electronics housing, the electronics housing having an end wall closed at one end except for one or more apertures to allow access to the source and detector;~~

~~(c) inserting the electronics housing into the outer housing so that it mates with the optical housing and defines therewith a substantially closed optical cavity between the end walls of the electronics and optical housings and in which a gas to be sensed is located in use; and~~

~~(d) securing the assembled housings together.~~

41. (Currently Amended) A ~~method according to claim 40, wherein step d) comprises applying potting compound to the assembled housings~~ sensor according to claim 22, wherein the cavity walls are covered by a radiation transparent protective coating.

42. (New) A sensor, according to claim 22, wherein the cavity, means for generating radiation, and detector are located within an outer housing having at least one aperture to allow gas to enter.

43. (New) A sensor according to claim 42, further comprising a flame arrestor within the outer housing.

44. (New) A sensor according to claim 43, wherein the flame arrestor is secured to an outer surface of a housing having at least one aperture, the housing defining a wall of the cavity, by a flange which overlaps the flame arrestor whereby, when the cavity housing is assembled in the outer housing, the flange defines the thickness of a gas chamber communicating with the apertures in the outer and cavity housings.

45. (New) A sensor according to claim 44, further comprising a memory such as an EEPROM, located within the outer housing for storing calibration data, the memory being coupled with electrical contacts such as pins accessible from outside the outer housing.

46. (New) A method of constructing a gas sensor according to claim 1, the method comprising:

(a) inserting a tubular, optical housing, closed by a wall at one end except for at least one gas access aperture, into a tubular outer housing closed at its end adjacent the closed end of the optical housing, except for at least one gas access opening;

(b) inserting a radiation source and detector on a printed circuit board into a tubular electronics housing, the electronics housing having an end wall closed at one end except for one or more apertures to allow access to the source and detector;

(c) inserting the electronics housing into the outer housing so that it mates with the optical housing and defines therewith a substantially closed optical cavity between the end walls of the electronics and optical housings and in which a gas to be sensed is located in use; and, (d) securing the assembled housings together.

47. (New) A method according to claim 46, wherein step d) comprises applying potting compound to the assembled housings.

48. (New) A method of constructing a gas sensor according to claim 22, the method comprising:

(a) inserting a tubular, optical housing, closed by a wall at one end except for at least one gas access aperture, into a tubular outer housing closed at its end adjacent the closed end of the optical housing, except for at least one gas access opening;

(b) inserting a radiation source and detector on a printed circuit board into a tubular electronics housing, the electronics housing having an end wall closed at one end except for one or more apertures to allow access to the source and detector;

(c) inserting the electronics housing into the outer housing so that it mates with the optical housing and defines therewith a substantially closed optical cavity between the end walls of the electronics and optical housings and in which a gas to be sensed is located in use; and, (d) securing the assembled housings together.

49. (New) A method according to claim 48, wherein step d) comprises applying potting compound to the assembled housings.